IN THE CLAIMS:

Please amend the claims to read as follows:

1. (Currently amended) A method for estimating a threshold value in deciding data along an amplitude by a terminal performing wireless communication with a wireless station in accordance with multi-level QAM (quadrature amplitude modulation), said method comprising ~~the steps of~~:

presupposing in which one of multiple levels can be ~~the~~ a level of a received data signal and setting up a plurality of threshold values assumed (referred to herein as 'assumed threshold values') in association with said presupposition;

updating sequentially the assumed threshold values based on the received data; and

selecting an ultimate threshold value from said plural assumed threshold values.

2. (Currently amended) The method according to claim 1, wherein said ~~third step~~ selecting includes ~~a step of~~ selecting one threshold value based on ~~the~~ a number of times of occurrence of the data pertaining to respective levels partitioned by said assumed threshold values.

3. (Currently amended) The method according to claim 1, wherein said ~~third step~~ selecting includes steps of:

calculating a difference between ratios between low level data and high level data separated by said plural assumed threshold values and a predetermined ratio; and

selecting the threshold value with the smaller difference.

4. (Currently amended) The method according to claim 1, wherein in said ~~third step~~ selecting, in performing ~~the steps of~~:

calculating a difference between the ratios between low level data and high level data separated by said plural assumed threshold values and the predetermined ratio; and

selecting the threshold value with the smaller difference;

a decision to the effect that there exists no proper value is made, and a value calculated last time is used, if said difference is larger than a predetermined value.

5. (Currently amended) The method according to claim 1, wherein said ~~third step~~ selecting includes ~~a step of~~ selecting a threshold value with a smaller difference of calculated average data of the plural data from respective received data.

6. (Currently amended) The method according to claim 1, wherein in said ~~third step~~ selecting, in performing a ~~step of~~ selecting a threshold value with a smaller difference of calculated average data of the plural data from respective received data, it is determined that there lacks a proper value and ~~the value calculated last time~~ a previous threshold value is used if said difference is larger than a predetermined value.

7. (Currently amended) The method according to claim 1, wherein said ~~second step~~ updating includes ~~a step of~~ presuming data positions for the totality of plural assumed threshold values, from one received data to another, and calculating the totality of the assumed threshold values.

8. (Currently amended) The method according to claim 1, wherein said ~~second step~~ updating detects to which level belongs the received data, for said assumed threshold values, and wherein, of said plural assumed threshold values, a certain one or ones may not be updated each time the data is received.

9. (Currently amended) The method according to claim 1, further comprising ~~a step of~~ transforming phase-synchronized received multi-level QAM data into data in the first quadrant of the coordinate system of I and Q axes, wherein

said data transformed into the data of the first quadrant is used as the data used in calculating the threshold values in said ~~first and second~~ presupposing and updating steps.

10. (Currently amended) The method according to claim 9, wherein said ~~step of~~ transforming the data to said first quadrant includes a step of moving the data into said first quadrant by taking an absolute value of the multi-level QAM data or by rotating the multi-level QAM data.

11. (Currently amended) The method according to claim 1, further comprising ~~the steps of~~:

normalizing the received data using a fading vector; and

providing a threshold value for amplitude demodulation as a coefficient for the fading vector to follow fading.

12. (Currently amended) The method according to claim 1, further comprising ~~a step of~~ calculating a threshold value from received data and re-calculating the threshold value with a

relatively short period for following fading.

13. (Currently amended) The method according to claim 1, wherein

in case the number of data used for calculating the threshold value exceeds a preset number, the updating of the assumed threshold value is terminated and wherein

one of a plurality of assumed threshold values is selected in said ~~third step~~ selecting.

14. (Currently amended) The method according to claim 1, wherein

in case the number of data used for calculating the threshold value exceeds a preset number, and an error between the value of the level of the multiple levels corresponding to said assumed threshold value and the data satisfies a preset condition, the updating of the assumed threshold value is terminated; and wherein

one of a plurality of said assumed threshold values is selected in said ~~third step~~ selecting.

15. (Currently amended) The method according to claim 1, further comprising ~~the steps of~~:

deciding which assumption has been correct, based on frequency of occurrence of the data in the level of the multiple levels corresponding to said assumed threshold value and/or on an error of the received data with respect to each assumed level of the multiple levels, to determine a threshold value; and

effecting amplitude demodulation using said threshold value.

16. (Currently amended) The method according to claim 1, wherein

the amplitude information is not definitely supplied from a wireless base station of a transmitting side to a terminal of a receiving side as a synchronization signal;

wherein said terminal assumes, at the outset, a plurality of possibilities as to which level said data belongs to, in said ~~first and second steps~~ presupposing and said updating, using the size of the received data, and raises accuracy of the assumed value, using a plural number of said data; and

wherein in said ~~third step~~ selecting, one of the plural assumed levels is selected, using the frequency of occurrence of each assumed level of the multiple levels, and differences with respect to the data, to estimate the threshold value to demodulate the data.

17. (Currently amended) The method according to claim 1, wherein said terminal has a threshold value detection unit including a counter for counting the received data and first to third counters for counting the data of first to third levels, divided by said first and second threshold values; said method comprising:

(a) ~~a step of~~ said threshold value detection unit initializing each of said counters;

(b) ~~a step of~~ said threshold value detection unit calculating, responsive to the value of a first input signal, a first threshold value in case the first input signal is assumed to be of one of high and low levels and a second threshold value in case the first input signal is assumed to be of another level;

(c) ~~a step of~~ said threshold value detection unit deciding, as from a signal next to the first input signal, ~~the~~ a relative magnitude of the input signal with respect to the first and second threshold values;

(d) ~~a step of~~ said threshold value detection unit summing the input data to a corresponding level holding value of said first to third level data, divided by said first and second values, based on the decided results, for averaging out the relevant level holding value;

(e) ~~a step of~~ said threshold value detection unit updating the first and second threshold values, based on said level holding values of said first to third levels;

(f) ~~a step of~~ said threshold value detection unit performing control for carrying out the decision and averaging processing as from said step (c), if the value of the counter counting said data is smaller than a preset first value;

(g) ~~a step of~~ said threshold value detection unit performing control so that, if the value of said counter counting the data is not less than said first value, the counter counting said data is compared to a second value, so that, if the value of said counter counting the data is less than said second value, error values between the level holding values of said first to third levels, divided by said first and second threshold values, and said input data, are compared to a preset third value, and so that, if the error value is not smaller than the preset third value, the decision and averaging processing as from said step (c) will be carried out: and

(h) ~~a step of~~ said threshold value detection unit performing control so that, if the error value is smaller than said third value, or the value of the counter counting the data is larger than said second value, the count value of said first counter is compared to the count value of said third counter, to output the threshold value with the larger count value.

18. (Currently amended) The method according to claim 1, wherein said terminal includes a threshold value detection unit at least including a counter for counting the received data; said

method comprising:

(a) ~~a step of~~ said threshold value detection unit initializing said counter;

(b) ~~a step of~~ said threshold value detection unit calculating, responsive to the value of a first input signal, a first threshold value and a second threshold value in case the first input signal is assumed to be of one of high and low levels and in case the first input signal is assumed to be of said another level, respectively;

(c) ~~a step of~~ said threshold value detection unit deciding, as from a signal next to the first input signal, the relative magnitudes of the input signals with respect to the first and second threshold values;

(d) ~~a step of~~ said threshold value detection unit adding input data to a corresponding level holding value of said first to third level data, divided by said first and second values, based on the decided results, for averaging out said level holding value;

(e) ~~a step of~~ said threshold value detection unit updating the first and second threshold values, based on said level holding values of said first to third levels;

(f) ~~a step of~~ said threshold value detection unit performing control for carrying out the decision and averaging processing as from said ~~step (c)~~ deciding, if the value of the counter counting said data is smaller than a preset first value;

(g) ~~a step of~~ said threshold value detection unit performing control so that, if the value of said counter counting the data is not less than said first value, the counter counting said data is compared to a second value and, if the value of said counter counting the data is less than said second value, error values between the level holding values of said first to third levels, divided by said first and second threshold values, and said input data, are compared to a preset third value, and so that, if the error value is not smaller than the preset third value,

the decision and averaging processing as from said ~~step (c)~~ deciding will be carried out: and

(h) ~~a step of~~ said threshold value detection unit performing control for outputting the threshold value with the ratio of the high level to the low level of the level holding value of each level closer to a preset ratio, if the error value is smaller than said third value, or the value of the counter counting the data is larger than said second value.

19. (Currently amended) The method according to claim 18, wherein said threshold value detection unit of said terminal includes first to third counters for counting data of said first to third levels, divided by said first and second threshold values;

said ~~step (a)~~ initializing including ~~a step of~~ initializing each counter;

said ~~step (d)~~ summing including ~~a step of~~ incrementing the associated counter based on the results of decision;

said ~~step (h)~~ performing control including ~~the steps of~~:

deciding whether or not the value of the ratio between the level holding value of said first level and the level holding value of said second level and the value of the ratio between the level holding value of said third level and the level holding value of said second level satisfy respective preset values; said step (h) deriving, in case of said ratio values not satisfying the respective preset values, the level holding value of said second level by averaging from the level holding value of said first or third level and from the level holding value of said second level, and updating the threshold value;

selecting the threshold value with the larger count value; and

using the last calculated value incase of absence of a proper ratio.

20. (Currently amended) The method according to claim 1, wherein said terminal includes a threshold value detection unit at least including a counter for counting the received data; said method comprising:

(a) ~~a step of~~ said threshold value detection unit initializing said counter;

(b) ~~a step of~~ said threshold value detection unit calculating and setting, responsive to the first input signal, each of first to m-th(where m is an integer not less than 1) threshold values, in case the first input value is presumed to be of the (m+1)-th level, from the first to m-th threshold values, in case the first input signal is presumed to be of the first level, m being a preset integer not less than 1;

said method also including, for each of the cases where the first input signal is assumed to be from the first level to the (m+1)-th level,

(c) ~~a step of~~ said threshold value detecting unit deciding, as from a signal next to the initial signal, the relative magnitude of the input data with respect to the first to mth threshold values of the input data;

(d) ~~a step of~~ said threshold value detecting unit updating, based on the decided results, an associated level holding values of the first level to the (m+1)-th level data, divided by said first to m-th threshold values, using the input data;

(e) ~~a step of~~ said threshold value detecting unit updating the threshold value, based on data of said first to (m+1)-th levels;

(f) ~~a step of~~ said threshold value detecting unit performing control for carrying out the processing of decision and updating as from said step (c) in case the value of the counter counting said data is smaller than a preset value; and

(g) ~~a step of~~ said threshold value detecting unit performing control so that, in case the

value of the counter counting said data is not smaller than a preset value, an error of a ratio as to the level holding values from a preset ratio is calculated for each of the first to m-th threshold levels, and each threshold value corresponding to a smaller error value is output.

21. (Original) The method according to claim 20, wherein, when said threshold value detecting unit updates an associated level holding value of the first to (m+1)-th level data, divided by said first to m-th threshold values, using said input data, a difference between the original level holding value and the input data multiplied by a preset coefficient is summed to the original level holding value.

22. (Currently amended) The method according to claim 1, wherein said terminal includes a threshold value detection unit at least having a counter for counting received data, said method comprising:

(a) ~~a step of~~ said threshold value detection unit initializing said counter; and

(b) ~~a step of~~ said threshold value detection unit calculating and setting, responsive to a value of the first input signal, each of the first to the m-th threshold values in case said first input signal is assumed to be of the (m+1)-th level, m being a preset integer not less than 1, from the first to m-th threshold values in case said first input signal is assumed to be of the first level;

said method also comprising, for each of the cases where the first input signal is assumed to be of the first to (m+1)-th levels,

(c) ~~a step of~~ said threshold value detection unit deciding, as from a signal next to the first signal, the relative magnitudes of the input data with respect to the first to m-th threshold

values;

(d) ~~a step of~~ said threshold value detection unit averaging, based on the decided results, an associated level holding values of said first to (m+1)-th level data, divided by said first to m-th threshold values, using the input data, and storing said input data in a storage unit;

(e) ~~a step of~~ said threshold value detection unit updating the value of said threshold value, based on the hold values of said first to (m+1)-th levels;

(f) ~~a step of~~ said threshold value detection unit performing control for carrying out the processing of decision and updating will be carried out as from a signal next to the step (c), in case the value of the counter counting the data is smaller than a preset value;

(g) ~~a step of~~ said threshold value detection unit calculating, in case the value of the counter counting said data is not less than said preset value, a total sum of the sum of errors of the data stored in said storage unit and the level holding values for the respective cases where said first input signal is assumed to be of the first level to the (m+1)-th levels (referred to as 'first to (m+1)-th errors'); and

(h) ~~a step of~~ comparing the relative magnitudes of said first to (m+1)-th differences and selecting and outputting the threshold value with a smaller difference.

23. (Currently amended) The method according to claim 20, wherein, in ~~said step of~~ deciding the relative magnitudes with respect to said first to m-th threshold values, the associated error is set to a predetermined value.

24. (Currently amended) The method according to claim 1, wherein said terminal includes a threshold value detection ~~unit; said~~ unit, said method comprising

(a) said threshold value detection unit calculating and setting, responsive to the first input signal, each of first to m-th threshold values, in case the first input value is presumed to be of the (m+1)-th level, from the first to m-th threshold value, in case the first input signal is presumed to be of the first level;

said method also including, for each of the cases where the first input signal is assumed to be from the first level to the (m+1)-th levels,

(b) deciding, as from a signal next to the first signal, the relative magnitudes of the input data with respect to the first to the m-th threshold value;

(c) summing the input data to an associated value of the first to (m+1)-th data, divided by said first to the m-th threshold values, divided by said first to m-th threshold values, based on said decided results, by way of averaging, and calculating an error;

(d) said threshold value detection unit re-calculating said threshold values, based on the data of said first level to the (m+1)-th level;

(e) further carrying out a sequence of decision and averaging operations in case the error value is larger than a predetermined first value;

(f) calculating, in case the error value is smaller than said first value, the sum or an average value of the latest differences of the input data with respect to the assumed differences of the first to (m+1)-th levels; and

(g) said threshold value detection unit deciding the minimum value among error values as results of respective assumptions, to decide which assumption has been correct, to output the value of the respective threshold values.

25. (Original) A terminal apparatus performing wireless communication with a wireless station in accordance with a multi-level QAM (quadrature amplitude modulation), said terminal apparatus comprising:

an amplitude synchronization detection unit for estimating a threshold value for deciding data along an amplitude; and

an amplitude demodulating unit for effecting amplitude demodulation using said threshold value;

said amplitude synchronization detection unit including:

a setup unit presupposing which level the received data signal may belong to and for setting up a plural number of threshold values that may be assumed in association with said presupposition (referred to as assumed threshold values);

a update unit sequentially updating said assumed threshold values based on the received data signal; and

a selection unit selecting an ultimate threshold value from the plural assumed threshold values.

26. (Currently amended) The terminal apparatus according to claim 25, wherein said selection unit selects one of said plural assumed threshold values based on ~~the~~ a number of times of occurrence of the data in said levels divided by said assumed threshold values.

27. (Original) The terminal apparatus according to claim 25, wherein said selection unit calculates a difference between ratios between the low level data and the high level data

divided by said plural assumed threshold values and a preset ratio and selects the threshold value with the smaller difference.

28. (Currently amended) The terminal apparatus according to claim 25, wherein, if, when said selection unit calculates a difference between ratios between the low level data and the high level data divided by said plural assumed threshold values and a preset ratio and selects the threshold value with the smaller difference, said difference is larger than a preset value, the selection unit determines that there lacks a proper value and uses a previous threshold value ~~found last time~~.

29. (Original) The terminal apparatus according to claim 25, wherein said selection unit selects the threshold value with a smaller difference from each received data of the ultimately calculated average data of plural data.

30. (Currently amended) The terminal apparatus according to claim 25, wherein, when said selection unit selects the threshold value with a smaller difference from each received data of the ultimately calculated average data of plural data, said difference is larger than a predetermined value, said selection unit determines that there lacks a proper value and uses ~~the~~ a previous threshold value ~~found last time~~.

31. (Original) The terminal apparatus according to claim 25, wherein said update unit presupposes data positions for the totality of the assumed threshold values, from one received data to another, to calculate the totality of the assumed threshold values.

32. (Original) The terminal apparatus according to claim 25, wherein said update unit detects to which level the received data belongs and wherein there are cases where plural assumed threshold values are not updated each time.

33. (Original) The terminal apparatus according to claim 25, further comprising

a transformation unit executing transformation of the phase-synchronized multi-level QAM data into a first quadrant of a coordinate system of I and Q axes; wherein threshold values are calculated on the basis of the transformed data.

34. (Original) The terminal apparatus according to claim 33, wherein said transformation unit moves the multi-level QAM data to the first quadrant of the I and Q axes by taking absolute values of or rotating the multi-level QAM data.

35. (Original) The terminal apparatus according to claim 25, further comprising

a unit for normalizing the received data using a fading vector; wherein

threshold value estimation is carried out on the basis of the normalized data; and wherein

a threshold value for amplitude demodulation is accorded as a coefficient for the fading vector for following up with fading.

36. (Original) The terminal apparatus according to claim 25, further comprising

a unit for calculating the threshold value from received data and for re-calculating the

threshold value with a relatively short period to follow fading.

37. (Original) The terminal apparatus according to claim 25, wherein

the updating of the assumed threshold value is terminated when the number of data used for calculating the threshold value has exceeded a predetermined number and whereinsaid selection unit selects one of the plural assumed threshold values.

38. (Original) The terminal apparatus according to claim 25, wherein the updating of the assumed threshold value is terminated when the number of data used for calculating the threshold value has exceeded a predetermined number and when an error value between the value of the level of the multiple levels corresponding to the assumed threshold value and the data meets a preset condition;

said selection unit then selecting one of the plural assumed threshold values.

39. (Currently amended) The terminal apparatus according to claim 25, wherein said selection unit decides which assumption is correct, based on the frequency of occurrence of data in the levels associated with said assumed threshold values and/or ~~the~~ on the difference of received data with respect to the assumed levels to determine the threshold value.

40. (Original) The terminal apparatus according to claim 25, wherein

said amplitude synchronization detection unit includes a threshold value detection unit at least having:

a counter for counting ~~the~~ a number of received data; and

first to third counters for counting data of first to third levels divided by said first and second threshold values;

said threshold value detection unit further including:

a first unit for initializing each of said counters;

a second unit for calculating, responsive to the value of the first input signal, a first threshold value in case the first input signal is assumed to be one of high and low levels and a second threshold value in case the first input signal is assumed to be another level;

a third unit for deciding, after the initial signal, the relative magnitudes of the input data with respect to the first and second threshold values;

a fourth unit for summing, based on the decided results, the input data to an associated level holding value of the first to third level data, divided by said first and second threshold values and for averaging;

a fifth unit for updating the values of said first and second threshold values, based on hold values of said first to third levels;

a sixth unit for performing control for carrying out decision and averaging of said third and fourth units in case the value of the counter counting said data is smaller than a preset first value;

a seventh unit for performing control so that, in case the value of the counter counting said data is not less than said first value, the count value of the count value of the counter counting the data is compared to a second value and so that, in case the value of said counter counting the data is smaller than said second value, a difference between the hold values of said first to third levels, divided by said first and second threshold values, and said input data, is compared to a preset third value, said seventh unit also performing control for carrying out

decision and averaging of said third and fourth units in case said difference is not less than said third value; and

an eighth unit for performing control so that, when said error value is smaller than said third value or the value of said counter counting said data is larger than said second value, the count values of said first to third counters are compared to each other and the threshold value with the larger count value is output;

said amplitude demodulating unit executing amplitude demodulation using the threshold value output from said threshold value detection unit.

41. (Original) The terminal apparatus according to claim 25, wherein

said amplitude synchronization detection unit includes a threshold value detection unit at least having a counter for counting the received data;

said threshold value detection unit at least further including:

a first unit for initializing said counter;

a second unit for calculating, responsive to the value of a first input signal, a fist threshold value in case said first input signal is assumed to be one of first and second levels, and a second threshold value in case said first input signal is assumed to be the other level;

a third unit for deciding, as from a signal next to the first signal, the relative magnitudes of the input data with respect to the first and second threshold values;

a fourth unit for summing input data to a corresponding level holding value of the first to third level data, divided by said first and second threshold values, by way of averaging;

a fifth unit for updating the values of said first and second threshold values, based on hold values of said first to third levels;

a sixth unit for performing control for carrying out decision and averaging of said third and fourth units in case the value of the counter counting said data is smaller than a preset first value;

a seventh unit for performing control so that, in case the value of the counter counting said data is not less than said first value, the count value of the counter counting the data is compared to a second value, and so that, in case the value of said counter counting the data is smaller than said second value, an error value between the level holding values of said first to third levels, divided by said first and second threshold values, and said input data, is compared to a preset third value, said seventh unit also performing control for carrying out decision and averaging of said third to fifth units in case said difference is not less than said third value; and

an eighth unit for performing control so that, in case said error value is smaller than said third value or the value of said counter counting said data is larger than said second value, the threshold value with a ratio of the high to low levels of level holding values of said respective levels closer to a preset ratio is output;

said amplitude demodulating unit executing amplitude demodulation using the threshold value output from said threshold value detection unit.

42. (Currently amended) The terminal apparatus according to claim 40, wherein

in said threshold value detection unit,

said fourth unit includes control means for incrementing the associated counter based on the decided results;

said eighth unit including deciding means for deciding whether or not the

value of a ratio between a hold value of said first level and a hold value of said second level assumes a preset value and also for deciding whether or not the value of a ratio between a hold value of said third level and a hold value of said second level assumes a preset value; said deciding means, in case the values of said ratios do not assume the preset values, deriving the hold value of said second level as an average value from the hold values of the first or third level and from the hold value of said second level to update the threshold ~~value;~~ value,

wherein said threshold value detection unit includes:

means for selecting the threshold value with a larger count value; and

means for using the previously calculated threshold value ~~calculated last time~~ in case there lacks a proper ratio.

43. (Original) The terminal apparatus according to claim 25, wherein

said amplitude synchronization detection unit includes a threshold value detection unit at least having a counter for counting the received data;

said threshold value detection unit at least further including

a first unit for initializing said counter;

a second unit for calculating and setting, responsive to a first input signal, respective threshold values from first to m-th(where m is an integer not less than 1) threshold values in case the first input signal is assumed to be of the first level to first to m-th threshold values in case the first input signal is assumed to be of the (m+1)-th level;

said threshold value detection unit also including, for each of the cases where said first input signals are assumed to be of the first to (m+1)-th level,

a third unit for deciding, as from a signal next to the first signal, the relative magnitudes of the input data with respect to the first to m-th threshold values;

a fourth unit for performing control, based on the decided results, for updating an associated level holding value of first to (m+1)-th level data, divided by said first to m-th threshold values, using the input data;

a fifth unit for updating the threshold value based on data of said first to (m+1)-th levels

a fifth unit for performing control for carrying out decision and updating of said third and fourth units in case the value of the counter counting said data is smaller than a preset value; and

a sixth unit for calculating, in case the value of said counter counting said data is not less than said preset value, an error of a ratio as to the level holding values from a preset ratio for each of the first to m-th threshold levels, and for selecting and outputting the respective threshold values corresponding to a smaller error;

said amplitude demodulating unit executing amplitude demodulation using the threshold values output from said threshold value detection unit.

44. (Original) The terminal apparatus according to claim 43, wherein, when the fourth unit of said threshold value detecting unit updates an associated level holding value of the first to (m+1)-th level data, divided by said first to m-th threshold values, using the input data, the difference between the original level holding values and input data multiplied by a preset coefficient is summed to the original level holding values.

45. (Original) The terminal apparatus according to claim 25, wherein said amplitude synchronization detection unit includes a threshold value detection unit at least having a counter for counting received data;

said threshold value detecting unit at least further including

a first unit for initializing said counter;

a second unit for calculating and setting, responsive to the value of the first input signal, respective threshold values from the first to m-th(where m is an integer not less than 1) threshold values, m being an integer not less than 1, in case the first input signal is assumed to be of the first level, to the first to m-th threshold values in case the first input signal is assumed to be of the (m+1)-th level;

said threshold value detection unit including, for each of the cases where said first input signal is assumed to be of the first to (m+1)-th level,

a third unit for deciding, as from a signal next to the first signal, the relative magnitudes of the input data with respect to the first to m-th threshold values;

a fourth unit for averaging, based on the decided results, the associated level holding value of the first to (m+1)-th level data, divided by said first to m-th threshold values, using input data, for averaging the associated level holding value and for storing the input data in a storage unit;

a fifth unit for updating the values of said threshold values based on hold values of said first to (m+1)-th level;

a sixth unit for performing control for carrying out the processing of decision and updating of said third and fourth units when the value of said counter counting said data is smaller than a preset value;

a seventh unit for calculation, in case the value of the counter counting said data is not less than said preset value, a total sum of the sum of errors of the data stored in said storage unit and the level holding values for the respective cases where said first input signal is assumed to be of the first level to the (m+1)-th levels (referred to as 'first to (m+1)-th errors'); and

a eighth unit for comparing the relative magnitudes of the first to (m+1)-th differences and for selecting and outputting a threshold value with a smaller difference;

said amplitude demodulating unit executing amplitude demodulation using the threshold value output from said threshold value detection unit.

46. (Original) The terminal apparatus according to claim 43, wherein, in deciding the relative magnitudes with respect to said first and second threshold values, the associated error is set to a preset value.

47. (Original) The terminal apparatus according to claim 25, wherein said amplitude synchronization detection unit includes a threshold value detection unit;

said threshold value detection unit includes a unit for calculating and setting, responsive to the value of the first input signal, respective threshold values from the first to m-th(where m is an integer not less than 1) threshold values, in case the first input signal is assumed to be of the first level, to the first to m-th threshold values in case the first input signal is assumed to be of the (m+1)-th level;

said threshold value detection unit also including, for each of the cases where the first input signal is assumed to be of from the first level to the (m+1)-th level,

a unit for performing control to execute

a first processing for deciding, as from a signal next to the first signal, the relative magnitudes of the input data with respect to the first to m-th threshold values;

a second processing for summing the input data to an associated level holding value of from the first to the (m+1)-th level data, divided by said first to m-th threshold values, based on the decided results, by way of averaging, and for obtaining respective error values;

a third processing for re-calculating the values of said threshold values, based on said data of from the first level to the (m+1)-th level;

a fourth processing for carrying out the decision and averaging of said first processing, second processing and said third processing in case the error values are larger than a predetermined first value: and

a fifth processing for calculating a sum or an average value of latest error values of said input data with respect to assumed data of from the first level to the (m+1)-th level, in case said error values are smaller than said first value; and

a unit for deciding the minimum value among error values as results of respective assumptions, to decide which assumption has been correct, to output the value of the respective threshold values;

said amplitude demodulating unit executing amplitude demodulation using the threshold value output from said threshold value detection unit.

48. (Currently amended) The terminal apparatus according to claim 25, comprising

a demodulating unit including a phase synchronization unit;

a fading vector estimating unit; and

~~said~~ an amplitude modulating unit;

said amplitude synchronization detection unit including

a first-quadrant transformation unit; and

a threshold value detection unit;

said fading vector estimating unit receiving a CPICH (common pilot channel) spread/demodulated signal to output a fading vector with a reduced noise ratio;

said phase synchronization unit receiving a HS-PDSCH (physical downlink common channel) spread/demodulated signal and multiplying the HS-PDSCH spread/demodulated signal with a complex conjugate of the fading vector, inclusive of the information on the transmission line, to generate HS-PDSCH 1 and HS-PDSCH Q signals freed of the phase offset which is the effect of the transmission line, to send said I and Q signals to said amplitude synchronization detection unit and to said amplitude demodulating unit;

said first-quadrant transformation unit including a unit for outputting a first quadrant signal obtained on transforming second, third and fourth quadrant signals of the phase-synchronized HS-PDSCH 1 and HS-PDSCH Q signals to the first quadrant;

said threshold value detection unit including a unit for calculating threshold values for the multi-level QAM from said first quadrant signal or from said first quadrant signal and the fading vector to send the threshold value signal to said amplitude demodulating unit;

said amplitude demodulating unit deciding the relative signal amplitudes of said threshold signals and said signals from said HS-PDSCH 1 and HS-PDSCH Q signals and said threshold signals to output multi-level QAM demodulated signals.

49. (Original) The terminal apparatus according to claim 48, wherein said threshold value

detection unit includes means for assuming a plurality of possibilities in advance, as to which level received data belongs to, with the use of the magnitude of the received signal, for improving the precision of the assumed values with the use of a plurality of said data, and for estimating the threshold values, from the assumed plural values, with the use of the frequency or an error from the data.

50. (Original) The terminal apparatus according to claim 49, wherein said threshold value detection unit multiplies the fading vector signal with the threshold value as found to output the resulting product as said threshold value signal.

51. (Original) A communication system comprising the terminal apparatus as set forth in claim 25 and a base station communicating with said mobile station in accordance with the multi-level QAM system.

52. (Original) A method for estimating a threshold value in order for a mobile station to decide data along an amplitude, said mobile station being a part of a cellular system in which data communication takes place for transmission from a base station to said mobile station over a downlink channel, using a high speed physical downlink shared channel (HS-PDSCH) in accordance with the multi-level QAM (quadrature amplitude modulation) system, said method comprising the steps of:

setting up an assumed value of said threshold value based on at least one of received data; and

determining the ultimate threshold value based on the threshold value updated in

accordance with received data.

53. (Original) A mobile station forming a cellular system in which data communication takes place for transmission from a base station to the mobile station over a downlink channel, using a high speed physical downlink shared channel (HS-PDSCH) in accordance with the multi-level QAM (quadrature amplitude modulation) system, said mobile station comprising:

a unit for setting an assumed value of said threshold value for deciding data in the amplitude direction, based on at least one of received data; and

a unit for determining the ultimate threshold value based on the threshold value updated in accordance with received data.